



CHAPTER I INTRODUCTION

Adsorption of surfactant at the solid/aqueous solution interface has been extensively studied in order to gain better understanding about the interactions between the surfactant and the solid surface. The information obtained is very useful in improving the efficiency of the industrial applications such as detergency, dispersion, stability of solids, flotation, etc. Numerous studies have been made on the adsorption of ionic surfactant from an aqueous solution onto oppositely charged substrates (i.e. porous alumina or silica). In the aqueous solution, the protonation or deprotonation of chemically adsorbed water will cause the solid surface to be charged, depending on the pH value of the solution. In mildly basic environment, cationic surfactants readily adsorb on silica; in mildly acidic environment, anionic surfactants adsorb on alumina. The surfactant adsorbed layer, so called “admicelle” or “hemimicelle”, is formed at the solid/aqueous solution interface if a critical concentration is exceeded.

Analogous to solubilization, the enhanced sorption of organic molecules on adsorbed surfactant (admicelles) is termed “adsolubilization”. Although there are many similarities between solubilization and adsolubilization, observed differences in the behavior are caused by different geometrical characteristics of micelles and admicelles. The reason for the differences is that aggregation of surfactant molecules at the water/mineral interface is not only determined by the interaction between the surfactant molecules, but also by the surfactant/solid surface interaction. In most cases the adsolubilization of neutral molecule is considered. The same situation prevails for the micellar solubilization effect or for the distribution of solutes between two-phase system such as 1-octanol/water; uncharged molecules are considered in most cases. The research on adsolubilization indicated that at high adsorption densities admicelles have adsolubilization capacities similar to micelle but with greater selectivity than micelles, probably because of the greater packing density in the admicelles. At lower adsorption densities the capacity of admicelle may be many times the capacity of micelle for amphiphilic molecule. The enhanced sorption/adsolubilization of organic contaminants on adsorbed surfactant on solid

surface is an important phenomenon for several applications such as surfactant-based separation and remediation. There are many factors that affect the adsolubilization such as the molecular structure of the surfactant, the pH of the aqueous phase, and ionic strength. In this work, we investigated the dependency of surfactant adsorption and adsolubilization of organic solutes with difference polarities on pH and ionic strength. In the first part, the adsorption of cationic surfactant, cetyltrimethyl ammonium bromide or CTAB, on precipitated silica was studied. In the second part, the adsolubilization of toluene and acetophenone in both single-solute and mixed-solute systems were examined at two pH values and various salt concentrations.